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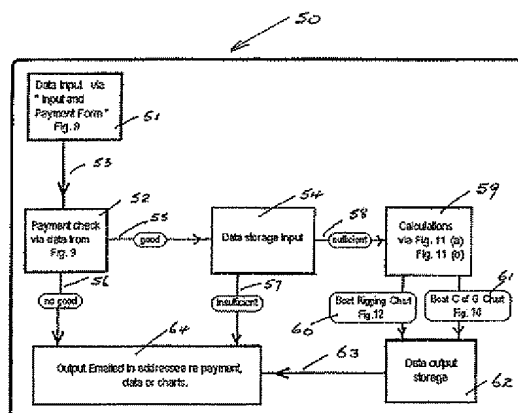
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(54) Title: METHOD AND SOFTWARE FOR DETERMINING ROW BOAT RIGGING SETTINGS

Block Diagram



(57) Abstract: Method and software for determining rowing boat parameters resides broadly in a method and software for determining rigging, centre of gravity and plane displacement of the rowing boat including: providing data entry means having descriptions describing a plurality of parameters of a rowing boat, one or more rowers, and a coach and parameter entry means for entering values for said parameters; determining said parameters in accordance with said descriptions; entering values for said parameters into said parameter entry means; uploading said values to data storage means operably associated with data processing means; selecting one or more of said values for input to a mathematical model programmed into the data processing means, the mathematical model being arranged to model the rigging and centre of gravity settings based on the performance characteristics of the rowing boat; calculating from the selected values a set of output settings for rigging, centre of gravity and plane displacement of the rowing boat, and presenting the output settings to the user.

**METHOD AND SOFTWARE FOR DETERMINING ROW BOAT RIGGING SETTINGS****Technical Field**

THIS INVENTION relates to a method and software for determining rowing boat parameters, and in particular to the rigging settings and/or centre of gravity settings of  
5 rowing boats used in both recreational and competitive rowing.

**Background Art**

Rigging for rowing boats used in competitive rowing has numerous settings which may be adjusted to accommodate anatomical variations of rowers for ergonomics, comfort, and/or efficiency. A rowing boat with properly adjusted settings is more likely to  
10 win rowing competitions because the rower or rowers are able to perform at their optimum efficiency and the boat is more likely to remain in the optimum plane of displacement. However, there are numerous settings and most rowing coaches are not aware of all of the settings that may be adjusted, or how they should be related to a rower's particular anatomical measurements and/or physiological development.  
15 Additionally, some settings are related to other settings, making the selection of the optimum settings complex.

The present invention aims to provide a method and software for determining rowing boat rigging and/or centre of gravity settings which alleviate one or more of the aforementioned problems. Other aims and advantages of the invention may become  
20 apparent from the following description.

**Summary of the Invention**

With the foregoing in view, the present invention resides broadly in a method of determining rigging and centre of gravity settings for a rowing boat including:

- providing data entry means having descriptions describing a plurality of parameters  
25 of a rowing boat, one or more rowers, and coach and parameter entry means for entering values for said parameters;
- determining said parameters in accordance with said descriptions;
- entering values for said parameters into said parameter entry means;
- uploading said values to data storage means operably associated with data  
30 processing means;
- selecting one or more of said values for input to a mathematical model programmed into the data processing means, the mathematical model being arranged to model the rigging and centre of gravity settings based on the performance characteristics of the rowing boat;

- calculating from the selected values a set of output settings for rigging and plane displacement of the rowing boat, and
- presenting the output settings to the user.

#### Outline of the invention

5     In another aspect, the invention resides broadly in a method of determining rigging settings for a rowing boat including:

- providing data entry means having descriptions describing a plurality of parameters of a rowing boat, one or more rowers, and a coach and parameter entry means for entering values for said parameters;
- 10   • determining said parameters in accordance with said descriptions;
- entering values for said parameters into said parameter entry means;
- uploading said values to data storage means operably associated with data processing means;
- selecting one or more of said values for input to a mathematical model programmed  
15   into the data processing means, the mathematical model being arranged to model the rigging settings based on the performance characteristics of the rowing boat;
- calculating from the selected values a set of output settings for rigging and plane displacement of the rowing boat, and
- presenting the output settings to the user.

20     In another aspect, the invention resides broadly in a method of determining centre of gravity settings for a rowing boat including:

- providing data entry means having descriptions describing a plurality of parameters of a rowing boat, one or more rowers, and a coach and parameter entry means for entering values for said parameters;
- 25   • determining said parameters in accordance with said descriptions;
- entering values for said parameters into said parameter entry means;
- uploading said values to data storage means operably associated with data processing means;
- selecting one or more of said values for input to a mathematical model programmed  
30   into the data processing means, the mathematical model being arranged to model the centre of gravity settings based on the performance characteristics of the rowing boat;
- calculating from the selected values a set of output settings for centre of gravity and plane displacement of the rowing boat, and

- presenting the output settings to the user.

Preferably, the explanation of each of the required parameters is provided on a computer screen or the like, and the output settings are presented on the computer screen or the like and/or printer attached to the computer. The computer may be  
5 provided with an operable connection to a network or the like as a host, and the user may access the host by way of another computer or a computer terminal which accesses the network as a client. Alternatively, the computer may be incorporated into a handheld electronic device incorporating input modules, the mathematical model, and an output device, such as a liquid crystal display for presenting the output settings to the  
10 user. It is preferred that the network be operably associated with the Internet and the like, with information being presented to the user in the form of one or more web pages stored on and downloadable from a web site. It is also preferred that the output settings be provided on a subscription basis such that the owner of the web site may be remunerated for providing the settings to the user. Preferably, the user receives the  
15 output settings in the form of a rigging chart and a centre of gravity chart for the rowing boat. Where a handheld device is provided, it may be operatively connectable to the network by any means, including wireless means, or a stand alone electronic device.

Preferably, the calculations are performed in accordance with methods for selecting the adjustments of the settings of a rowing boat published by the Federation  
20 Internationale des Societes d'Aviron ( FISA ) in, for example, their instruction manuals entitled "BASIC RIGGING" and " LEVEL II COACHING HANDBOOK". In a preferred form, the calculations are performed in accordance with a mathematical model based upon and/or refined from methods published by FISA. However, additional rigging and centre of gravity settings and/or more refined calculations may be provided beyond those  
25 published by FISA.

In another aspect, present invention resides broadly in software for calculating rigging and centre of gravity settings for a rowing boat including:

- an input module for receiving information relating to a set of parameters of a rowing boat, one or more rowers, and a coach;
- 30 • a calculating module incorporating a mathematical model arranged to model the rigging and centre of gravity settings of the rowing boat based on the performance parameters of the rowing boat and calculating a set of output settings for the rigging and centre of gravity of the rowing boat, and
- output modules for presenting the output settings to a user.

Preferably, the input module includes a web page or the like divided into rows and columns, one column having a set of blank input windows and a corresponding set of explanatory windows having an explanation of the input required from the user for the blank input window. More preferably, the input module includes one or more web pages  
5 having one or more graphical illustrations of the measurements required, a plurality of sets of input windows for input of the relevant measurements.

In a preferred form, the web pages are categorized into a "boat detail" web page setting out the details of the measurements of the boat that are to be required and spaces for the measurements to be written, a "boat measurement details" web page  
10 providing details of how to take the required boat measurements, a "body details" web page setting out details of the measurements of the rower or rowers that are required and spaces for the measurements to be written, a "body measurement details" web page providing details of how to take the rower or rowers required body measurements, a "coach variables" web page setting out the preferred operational parameters that can  
15 be selected by the coach and spaces for the selections to be written, a "coach variables detail" web page wherein an explanation of how the selections available to the coach are determined, a "boat centre of gravity" web page setting out the details of the measurements required from the boat, rower or rowers body measurements and coach variables that are to be provided and spaces for the measurements to be written,  
20 and a "boat centre of gravity detail" web page providing an explanation of how to obtain the measurements required for boat centre of gravity. In such form, it is preferred that the measurements, selections, variables and such like are taken and written in the spaces on a printout of the above mentioned web pages, and the information may be then uploaded to the network by way of an "input and payment"  
25 page. Alternatively, the information may be provided by way of the categorized web pages described above by directly entering the information into the blank spaces in the respective web pages. The user may be able to select whether the software produces a rigging chart and centre of gravity chart, or either of these alone.

### Brief Description of the Drawings

In order that the invention may be more readily understood and put into practical effect, reference will now be made to the accompanying drawings which illustrate a preferred embodiment of the invention, and wherein:

#### 5 Input module information required and explanation.

Fig.1 is a sample printout of a "boat details" web page;

Fig.2 is a sample printout of a "boat measurement details" web page;

Fig.3 is a sample printout of a "body details" web page;

Fig.4 is a sample printout of a "body measurement details" web page;

10 Fig.5 is a sample printout of a "coach variables" web page;

Fig.6 is a sample printout of a "coach variables detail" web page;

Fig.7 is a sample printout of a "boat centre of gravity" web page;

Fig.8 is a sample printout of a "boat centre of gravity details" web page;

#### Actual input module data form.

15 Fig.9 is a sample printout of a "Input and Payment Form" web page;

#### Calculating module

Fig.10 is a block diagram of software for calculating the rigging and centre of gravity settings of a rowing boat according to the invention;

20 Fig.11 (a) is a summary of the necessary inputs to the various outputs for the rowing boat rigging chart output;

Fig.11 (b) is a summary of the necessary inputs to the output for the rowing boat longitudinal centre of gravity output;

#### Output modules ( examples )

Fig.12 is a sample printout of a "sample rigging chart" web page;

25 Fig.13 is a sample printout of a " rigging chart instructions" web page; and

Fig.14 is a sample printout of a "sample centre of gravity chart" web page.

30 Figs. 1 to 8 collectively show the information required and explanation for the input module described with reference to Fig. 10. Figs. 9 and 12 to 14 collectively show the output module described with reference to Fig. 10. The web pages shown in Figs. 1 to 8 and 12 to 14 have a common hyperlink table in a separate frame ( not shown ) to enable navigation about the web site. By printing ( frames of ) the web pages shown in Figs. 1 to 8, the user can use the printed sheets to obtain all the measurements by following the instructions provided and then input the information by filling in the email form of Fig.9 and uploading it to the host computer.

## The Description of the Invention

### INPUT MODULE

The input module is concerned with the information required for the mathematical module to calculate the rigging and the centre of gravity settings. In order to provide a convenient interface for the user, the input module is divided into two principal parts, one which presents to the user an explanation of what is required, with a convenient form to write in the information to be uploaded, and the other part to enter and upload the information to the calculation module. The first part is further divided into several categories so that the required inputs are easy for the user to understand. When the required inputs have been obtained they are entered into a form uploaded to the calculations module, from which the output settings of a rigging chart for a rowing boat are calculated.

The categories of web pages are described with reference to Figs. 1 to 8 below. The 'boat details' web page illustrated in Fig.1 is divided into sections on boat background data and coxswain details thereunder and rower position data towards the bottom of the page. Each section has a parameter explanation column divided into a plurality of rows for the parameter to be obtained. The parameter explanation column includes an abbreviation description below for the parameter to be obtained in each row and a long handed description adjacent to the abbreviation. In the boat detail section the parameters comprise: RO ( Regatta On (date) ); RA ( Regatta At ( place ) ); BN ( Boat Name ); BC ( Boat Category ); BL ( Boat Length ); BW ( Boat Weight ). The coxswain details section comprises: CN ( Cox's Name ); CW ( Cox's Weight ); DSC ( Distance from Stern to Centre of seat ). The Rower Position Data section comprises: PIB ( Position In Boat ); STS ( distance from Stern To Spread/span point ); WB ( Width of Boat inside washboard to washboard along spread/span line ); DB ( Depth of Boat at spread/span line top of washboard to bottom of keel ); WLW ( WaterLine to Washboard with boat fully crewed and equipped ); STW ( lowest point of Seat to Top of Washboard ); PD ( Pin Diameter ); GBO ( Gate Base Offset ); ODB ( Oar Diameter at Button ); ODH ( Oar Diameter at Handle ); OOH ( Oar Offset at Handle ); FAK ( Footrest Angle to Keel ); FSA ( Footrest Separation Angle heel to heel ); FSW ( Footrest Support to Washboard ); FHK ( Footrest Heel to bottom of Keel ); OT ( Oar Type : 1 = Cleaver , 2 = Maron ); OBL ( Oar Blade Length ); OBW ( Oar Blade Width ); OBA ( Oar Blade Angle to shaft ); OW ( Oar Weight ); SAS ( Seat Axle Spacing ). Where required, the units for the relevant parameters are also shown in parenthesis.

In the boat data and coxswain data sections, a single parameter data column is provided alongside the parameter explanation column for information required under the heading "INPUT". However, in the rower position data section, eight parameter data columns are provided alongside the explanation column, four under the heading "USE for All Boats" and four under the heading "USE for 8+ only". Some of the remaining spaces on the web page are provided with explanatory notes, some of which are under the heading "RECOMMENDATIONS". The "Boat Measurement Detail" web page illustrated in Fig. 2 includes detailed diagrammatic and written explanations including notes of what is meant and how to obtain the information for the "Boat Details" web page described with reference to Fig. 1.

The "Body Details" web page illustrated in Fig. 3 and the "Coach Variables" web page illustration in Fig. 5 are each divided into the boat data section, coxswain details section and rower data section in a similar fashion to that described with reference to Fig. 1. The "Body Details" web page has common data in relationship to the sections in reference to the boat information and the coxswain information as does the "Boat Details" web page. These are: RO (Regatta On (date)); RA (Regatta At (place)); BN (Boat Name); CN (Cox's Name); CW (Cox's Weight); DSC (Distance from stern to centre of seat). The rower data section comprises: PIB (Position in boat); RN (Rower Name); DOB (Date Of Birth); RC (Rower Category ("1" for a girl, "2" for a boy, "3" for a woman, "4" for a man, or "5" for a special category, where the coach nominates the vertical and lateral pitch)); RW (Rower Weight); RH (Rower Height); IL (Inner Leg); OL (Outer Leg); LL (Lower Leg); STH (Sternum To Heel); IA (Inner Arm); FL (Foot Length).

In the "Coach Variable" web page, the boat data section comprises: RO (Regatta On (date)); RA (Regatta At (place)); BN (Boat Name); which are common to several of the web pages to enable a reference so that the data can be filed for future reference and cross-referenced. The rower data section comprises: PIB (Position In Boat); SAP (Slide Ahead of Pin); OI (Oar Inboard); SOO (Scull Oar Overlap); GHD (Gate Height Difference); SOP (Scull Oar Position ("1" is for L/R, "2" is for R/L)); GR (Gearing Ratio); CA (Catch Angle); FA (Finishing Angle); SS (Spread Span ("1" is for Fixed, "2" is for Variable)); LBA (Lay-back Angle); VP (Vertical Pitch); LP (Lateral Pitch).

The "Body Measurement Details" and "Coach Variables Details" illustrated in Figs. 4 and 6 are set out in similar fashion to the "Boat Measurement Details". An explanation of the relevant information is given with a diagram and notes. The notes



give an explanation of how to obtain the information. The parameters required under the "Boat Details", "Body Details" and "Coach Variables" categories are stand alone and when entered into the mathematical model can produce an output as described with reference to Fig. 12, "Sample Rigging Chart".

- 5 The "Boat Centre of Gravity" web page illustrated in Fig. 7 is divided into four sections: boat detail, coxswain detail, rower detail and coach variables. Each of these sections has a parameter explanation column which includes an abbreviation and a long handed description adjacent to the abbreviation in similar fashion to the web pages illustrated in Figs. 1, 3 and 5. In the boat and coxswain detail sections, a single
- 10 parameter data column is provided alongside the parameter explanation column for the input information required. These parameters comprise: RO (Regatta On (date)); RA (Regatta At (place)); BN (Boat Name); BC (Boat Category); BL (Boat Length); BW (Boat Weight); OW (Oar Weight); CN (Cox's Name); CW (Cox's Weight); DSC (Distance from Stern to Centre of seat); DOB (Date Of Birth). In the rower
- 15 detail and coach variables sections, eight parameter data columns are provided alongside the parameter explanation column for the input information required. These parameters comprise: PIB (Position In Boat); STS (distance from Spread/span point To Stern); OW (Oar Weight); RN (Rower's Name); RW (Rower's Weight); RH (Rower's Height); IL (Inner Leg); IA (length of Inner Arm). In the coach variable
- 20 section, the parameters comprise: SAP (Slide distance Ahead of spread/span Point (pin)); OI (Oar Inboard); GR (Gearing Ratio); CA (Catch Angle); FA (Finishing Angle); SS Span ("1" is for set, "2" is for variable); LBA (Lay-Back Angle); PS (Preferred Stroke).

- 25 The "Boat Centre of Gravity Detail" web page illustrated in Fig. 8 gives a detailed explanation by way of diagrams and notes of what is meant and how to obtain the information for input into the parameter data columns of Fig. 7. The parameters required under the "Boat Centre of Gravity" web page can stand alone and can produce, when the values for the parameters are entered into the mathematical model, an output as described with reference to Fig. 13 "Sample Centre of Gravity Chart".

- 30 The method of input is by an input and payment form, an example of which is attached as Fig. 9 "Sample Input and Payment Form". The data is input on to this web page then transmitted via email to the owner of the web site. It is also envisaged that the result may be uploaded instantaneously upon clearance of the payment medium. The "Sample Input and Payment Form" consists of eight sections comprising:

the requesting organization; regatta details; boat details, boat measurements detail; coxswain detail; rowers' body detail; coach variables and payment form. The regatta detail, boat detail, boat measurements detail, coxswain detail, rowers' body detail and coach variables all have parameter explanation columns including an abbreviation for the  
 5 parameter to be entered in each row and  
 a long handed description adjacent to the abbreviation corresponding to those described with reference to Figs. 1 to 9.

In the regatta detail section the parameters comprise: RO ; (Regatta Name ) ; RA ; RC . In the boat detail section the parameters comprise: BN ; BC ; BL ; BW . In the  
 10 boat measurements detail section the parameters comprise: PIB ; STS ; WB ; DB ; WLW ; STW ; PD ; GBO ; ODB ; ODH ; OOH ; FAK ; FSA ; FSW ; FHW ; OT ; OBL ; OBW ; OBA ; OW ; SAS. In the coxswain detail section the parameters comprise: CN ; CW ; DSC ; DOB . In the rowers' body detail section the parameters comprise: PIB ; RN ; DOB ; RC ; RW ; RH ; IL ; OL ; LL ; STH ; IA ; FL .  
 15 In the coach variables section the parameters comprise: SAP ; OI ; GR ; CA ; FA ; SS ; LBA ; VP ; LP ; and PS .

The organization name, regatta details, boat details and coxswain sections have a single parameter data column available for input data while BC ( Boat Category ) is programmed that when a category between one and nine is entered the column/s  
 20 required to be filled out are indicated by way of positions and numbers appearing in the PIB ( Position In Boat ) column/s and also indicates if the coxswain details are to be filled out. Examples of this are: if "1" ( a sculler ) is indicated in the parameter box BC, "sculler" will appear in the left column of the PIB parameter box under boat measurement details, rowers' body details and coach variables and the remainder of the  
 25 columns will be blank, while coxswain will not appear over the column for coxswain detail ; should "7" ( four without coxswain ) be indicated in the parameter box BC, "stroke" will appear in the left column, "3" will appear in the next column from the left, "2" will appear in the third column from the left and "bow" will appear in the fourth column from the left of the PIB parameter box under boat measurement details, rowers'  
 30 body details and coach variables and the remainder of the columns will be blank while the heading coxswain will not appear over the column for coxswain detail ; and should "9" ( eight with coxswain ) be indicated in the parameter box BC, "stroke" will appear in the left column, "7" will appear in the next column from the left, "6" will appear in the third column from the left , "5" will appear in the fourth column from the left, "4" will

appear in the fifth column from the left, "3" will appear in the sixth column from the left, "2" will appear in the seventh column from the left and "bow" will appear in the eighth column from the left of the PIB parameter box under boat measurement details, rowers' body details and coach variables while the heading "coxswain" will appear over  
 5 the column for coxswain detail.

The boat measurements detail, rowers' body detail and coach variables all have eight parameter data columns. The columns available for use can be restricted by what is indicated in the BC parameter box as outlined in the previous paragraph. The payment form section requests credit type, card number, expiry date, name of card  
 10 holder, billing address and email address along with the email address of the web site owner.

#### CALCULATION MODULE

In the type of calculations to be performed box, there are three options: Firstly, should "1" be indicated, the input parameters needed to complete a rigging chart  
 15 will appear; should "2" be indicated, only those input parameters needed to complete a centre of gravity chart will appear; should "3" be indicated, only the parameters needed to complete a rigging chart and a boat centre of gravity chart will appear. Secondly, should "1", "2", "3", or "4" (standardized VP and LP settings) be indicated in the RC (rower category) box, the parameters VP and LP under coach variables will not be  
 20 indicated for inclusion, but should "5" be indicated in the RC box, the parameters VP and LP under coach variables will be indicated for inclusion. Thirdly, should "1", "2", "3" or "4" (scull oared boats) be indicated in the BC (boat category) box, the additional parameters (SOO; GHD and SOP) will be indicated but will not be indicated if any of the parameters "5" to "9" (sweep oared boats) is indicated in the BC box.

25 The block diagram 50 illustrated in Fig. 10 shows in diagrammatic form the operational aspects of the software which produces output from data input by way of an input and payment form described with reference to Fig. 9. Data input by way of a data input module 51 is uploaded to a data storage input module 54 by way of a payment check module 52, the data flow being by way of arrows 53 and 55  
 30 respectively. If the payment check proves no good, the program flow is directed by way of arrow 56 to the output module 64 which provides for output to be emailed to the user. The data storage input module 54 checks for sufficiency of data, and if insufficient, program flow is directed by way of arrow 57 to the output module 64 which provides for the sending of email to the user indicating, for example, which information

is required. Where sufficient information is provided, the program flow is directed to a calculations module 59 by way of arrow 58 which makes calculations, and directs program flow to either or both a boat rigging chart module 60 and/or a boat centre of gravity chart module 61. Output data is stored ( at least temporarily ) in a data output storage module 62, and program flow is directed to the output module 64 by way of arrow 63.

The inputs used in obtaining the outputs for the rowing " Boat Rigging Chart " can be seen in Fig. 11 (a) . The abbreviations and the longhand text are the same as used in the web input page parameters previously described. To give an example, the output " Slide Length " requires input information: RH ( Rower Height ) and SAP ( Slide Ahead of Pin ) and output " Spread Span point to Finish point " requires RH ( Rower Height ). In some of the more complicated calculations some of the inputs may be used more than once.

The inputs used in obtaining the outputs for the rowing " Boat Centre of Gravity Chart " are shown in Fig. 11(b). The abbreviations and longhand text are the same as the web input page parameters previously described.

#### OUTPUT MODULE

There are two parts to the output. They are a rigging chart, a sample of which appears as Fig. 12 " Sample Rigging Chart ", and a centre of gravity chart, a sample of which appears as Fig. 14 " Sample Centre of Gravity Chart ". The rigging chart reproduces some of the information directly which was provided via the input and payment form such as regatta, boat and crew basic detail along with coach variables. This is done so that the information can be checked for accuracy. However, such measurements or settings as slide length, spread span point to finish point, spread span point to footheel point, footrest heel to washboard, spread span point to pin ( span ), and gate height, will be calculated along with the required oar length, catch pitch, finishing pitch, working arch, span line to finish arch point, finish arch point to catch arch point and available boat oar shift per stroke. This data is provided for each rower in the rowing boat for their respective position in the boat. The coach can adjust the rigging settings of the boat to suit the each rower's physical attributes in accordance with the calculated settings. Although the sample attached only shows the first four positions in a sweep oared eight the output is able to provide for single sculls through the full range of competitive rowing boats to a sweep oared eight. The " Rigging Chart Instructions " shown in web page Fig. 13 is provided as an adjunct to the

rigging chart. The rigging chart instructions web page explains by diagram and accompanying notes how to use the output provided.

The Centre of Gravity Chart provides: an existing boat centre of gravity in comparison to the centre of the boat; a target centre of gravity; the target centre of gravity is achieved by the theoretical addition of weights; percentage increase of the wetted surface area; a crew rearrangement to achieve as near as possible the target centre of gravity without weight/s; the adjusted crew target centre of gravity with weights added if necessary and recalculated wetted surface as percentage.

The centre of gravity is a stand alone module and need only have inputs into the input and payment form that appear in Fig. 7 relevant to the "boat centre of gravity". The input module is set up to receive all variables to be entered by the coach rather than provide, for example "default" settings, and the data storage module is set up to prompt the user for missing information if a sample rigging chart is requested with insufficient information being entered.

Although the invention has been described with reference to a specific example, it will be appreciated by those skilled in the art that the invention may be embodied in other forms within the broad scope and ambit of the invention as herein set forth.

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**The claims defining the invention are as follows:**

1. Method and software for determining rowing boat parameters resides broadly in a method of determining rigging settings for rowing boats including:
  - providing data entry means having descriptions describing a plurality of parameters of
  - 5 a rowing boat, one or more rowers, and a coach and parameter entry means for entering values for said parameters;
  - determining said parameters in accordance with said descriptions;
  - entering values for said parameters into said parameter entry means;
  - uploading said values to data storage means operably associated with data
  - 10 processing means;
  - selecting one or more of said values for input to a mathematical model programmed into the data processing means, the mathematical model being arranged to model rigging settings based on the performance characteristics of the rowing boat;
  - calculating from the selected values a set of output settings for rigging and plane
  - 15 displacement of the rowing boat, and
  - presenting the output setting to the user.
2. Method and software for determining rowing boat parameters resides broadly in the method of determining the centre of gravity settings for a rowing boat including:
  - providing data entry means having descriptions describing a plurality of parameters
  - 20 of a rowing boat, one or more rowers, and a coach and parameter entry means for entering values for said parameters;
  - determining said parameters in accordance with said descriptions;
  - entering values for said parameters into said parameter entry means;
  - uploading said values to data storage means operably associated with data
  - 25 processing means;
  - selecting one or more of said values for input to a mathematical model programmed into the data processing means, the mathematical model being arranged to model centre of gravity settings based on the performance characteristics of the rowing boat;
  - 30 • calculating from the selected values a set of output settings for centre of gravity and plane displacement of the rowing boat, and
  - presenting the output setting to the user.

3. Method and software for determining rowing boat parameters resides broadly in software for calculating rigging settings and centre of gravity settings for a rowing boat including:

- an input module for receiving information relating to a set of parameters of a rowing  
5 boat, one or more rowers, and a coach;
  - a calculating module incorporating a mathematical model arranged to model the rigging and centre of gravity settings of the rowing boat based on the performance parameters of the rowing boat and calculating a set of output settings for the rigging and centre of gravity of the rowing boat, and  
10 • output modules for presenting the output settings to a user.
4. Method and software for determining row boat rigging settings for any one of claims 1, 2 & 3 is any method or software that provides any method and software of inputting data taken from the rower/s, the rowing means (boats etc), "coach/adviser" and other parameters used in the calculations of rigging settings and centre of gravity  
15 settings or the like.
5. Method and software for determining row boat rigging settings for any one of claims 1, 2 & 3 is any method or software that provides any method and software of calculating data taken from the rower/s, the rowing means (boats etc), "coach/adviser" and other parameters used in the calculations of rigging settings and centre of gravity  
20 settings or the like.
6. Method and software for determining row boat rigging settings for any one of claims 1, 2 & 3 is any method or software that provides any method and software of presenting the calculated output data to the users taken from the rower/s, the rowing means (boats etc), "coach/adviser" and other parameters used in the calculations of  
25 rigging settings and centre of gravity settings or the like.

Dated this seventh day of November, 2001.

DAVID ALISTAIR GREEN

## Boat Details

Fig. 1

The more accurate your measurements the more efficient the output.

BOAT DETAIL	INPUT	RECOMMENDATIONS
RO Regatta On date		1. Print off Boat Details and Boat Measurement Details forms from the Web.
RA Regatta At place		
BN Boat Name		
BC Boat Category		2. Retain copies in your register so you will not have to measure the boat again unless you change fittings etc on the boat.
BL Boat Length		
BW Boat Weight	kg	
<b>COXSWAIN DETAILS</b>		3. Once you have done all the measurements e-mail them on the Input and Payment Form.
CN Cox's Name		
CW Cox's Weight	kg	
DSC Distance from stern to center of seat	cm	

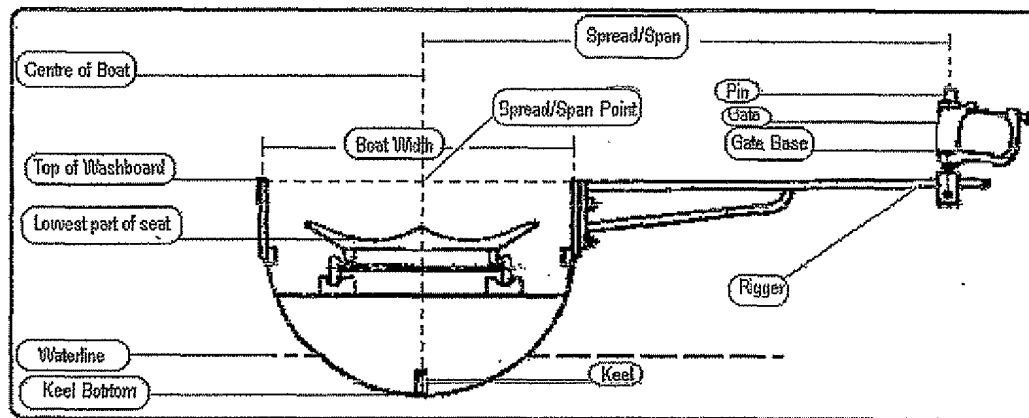
WHEN FILLING OUT THE FOLLOWING TABLE START AT THE LEFT COLUMN AND INDICATE THE STROKE THEN MOVE TOWARDS THE RIGHT COLUMN INDICATING THE VARIOUS POSITIONS IN THE BOAT IN ORDER TO THE BOW (1).

POSITION DETAIL	USE for All Boats				USE for 8+ only			
	8/4/2/1	7/3/1	6/2	5/1	4	3	2	1
PIB Position in Boat								
STS Distance from stern to spread/span point (in cm)								
WB Width of boat inside w/board to w/board along s/s line (in cm)								
DB Depth of boat at s/s line top of washboard to bottom of keel (in cm)								
WLW Waterline to w/board with boat fully crewed and equipped (in cm)								
STW Lowest point of seat to top of washboard (in cm)								
PD Pin Diameter (in cm)								
GBO Gate Base Offset (in cm)								
ODB Oar Diameter at Button (in cm)								
ODH Oar Diameter at Handle (in cm)								
OOH Oar Offset at Handle (in cm)								
FAK Footrest Angle to Keel (in deg)								
FSA Footrest separation angle heel to heel (in deg)								
FSW Footrest Support to Washboard (in cm)								
FHK Footrest Heel to bottom of Keel (in cm)								
OT Oar Type- 1 = Cleaver, 2 = Macron								
OBL Oar Blade Length (in cm)								
OBW Oar Blade Width (in cm)								
OBA Oar Blade Angle to shaft (in deg)								
OW Oar Weight (in kg)								
SAS Seat Axle Spacing (in cm)								

**OUTPUT** A Rigging Chart will be returned within 24 hrs. For layout see Sample Rigging Chart.



## Boat Measurement Details

Fig.2<sub>p1</sub>

## SOME TERMS

**Spread/Span** Distance from the centre of the boat to the centre of the pin. In sculling this is provided for both stroke and bow side pins.

**Spread/Span Point** The point along the centre of the boat when the pin is at a right angle to the keel.

**Washboard** The timber or composite that runs the length of the boat's cockpit on both sides. It is central to the measurements of inputs and outputs. It is the one common constant. If the line of the washboard is interrupted by cutaways the line of the washboard is to be a line along the top of the washboard above the cut-outs.

**BN** Boat Name

**BC** Boat Category

1 = 1X	2 = 2X	3 = 4X	4 = 4X+	5 = 2	6 = 2+	7 = 4	8 = 4+	9 = 8+
--------	--------	--------	---------	-------	--------	-------	--------	--------

**BL** Boat Length from Stern to Bow. Ensure tape is straight and tight. (in cm)

**BW** Boat Weight fully rigged without crew and oars. (in kg)

**DSC** Distance from stern to centre of Coxswain seat. (in cm)

**STS** Distance from stern to spread / span (s/s) point for each position in the boat. (in cm)

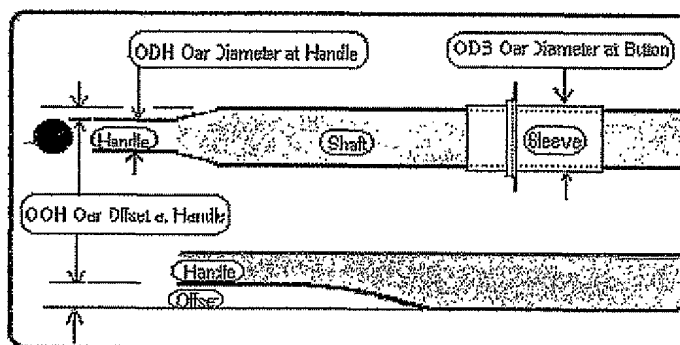
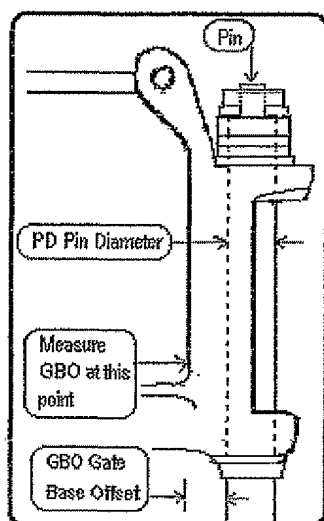
**WB** Width of Boat The width of the boat inside top washboard to top washboard at the spread/span point. (in cm)

**BD** Boat Depth. The depth of the boat at s/s point from top washboard to keel bottom. (in cm)

**WLW** Waterline to (top) washboard with boat fully crewed and equipped for racing. (in cm)

**STW** Lowest part of seat to top of washboard. (in cm)

## Boat Measurement Details

Fig.2<sub>p2</sub>

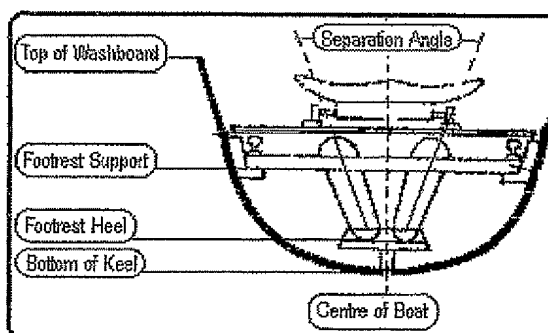
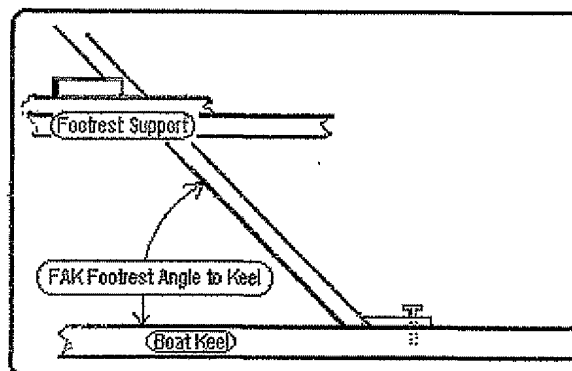
**PD** Pin Diameter (in cm)  
**GBO** Gate Base Offset (in cm)  
**ODB** Oar Diameter at Button (in cm)  
**ODH** Oar Diameter at Handle (in cm)  
**OOH** Oar Offset at Handle (in cm)

**FAK** Footrest Angle to Keel (in deg)

**FSA** Footrest Separation Angle Heel to Heel (in deg)

**FSW** Footrest Support to Washboard (in cm).

**FHK** Footrest Heel to Keel (in cm)



## Boat Measurement Details

Fig.2p3

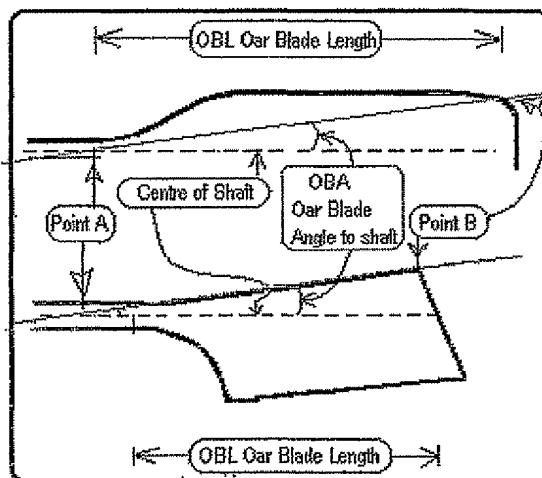
**OT** Oar type; 1 = Cleaver, 2 = Macron

**OBL** Oar Blade Length. Length of oar blade in the centre of the blade at a line as an extension of the oar shaft.

**OBW** Oar Blade Width. Width of oar blade at the widest part of the blade.

**OBA** Oar Blade Angle. Angle of the oar blade top to oar shaft (in degrees). A line is drawn from point A to point B (red line) and the angle is measured to the centre of the shaft.

**OW** Oar Weight. Rowing\_weight fully fitted. (in kg)



**SAS** Seat Axle Spacing. Distance from front axle to back axle. (in cm)

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## Body Details

Fig. 3

The more accurate your measurements the more efficient the output.

BOAT DETAIL	INPUT	RECOMMENDATIONS
RO Regatta On (date)		1. Print off Body Details and <u>Body Measurement Details</u> forms from the Web.  2. Retain copies in your crew register so you will not have to re-measure all crew members if crew is changed.
RA Regatta At (place)		
BN Boat Name		
<b>COXSWAIN DETAILS</b>		3. Once you have done all the measurements e-mail them on the <u>Input and Payment Form</u> .
CN Cox's Name		
CW Cox's Weight	(in kg)	
DSC Distance from stern to center of seat	(in cm)	
DOB Date of Birth (if app)		

WHEN FILLING OUT THE FOLLOWING TABLE START AT THE LEFT COLUMN AND INDICATE THE STROKE THEN MOVE TOWARDS THE RIGHT COLUMN INDICATING THE VARIOUS POSITIONS IN THE BOAT IN ORDER TO THE BOW (1).

ROWER DETAIL	USE for All Boats				USE for 8+ only			
	8/4/2/1	7/3/1	6/2	5/1	4	3	2	1
PIB Position in Boat								
RN Rowers Name first 4 letters								
DOB If applicable								
RC Rower Category								
<input type="checkbox"/> Novice <input type="checkbox"/> Club <input type="checkbox"/> Open A <input type="checkbox"/> Special - 6 (You nominate the V/Pitch and 4 Pitch)								
RW Rowers Weight (in kg)								
RH Rowers Height (in cm)								
IL Inner Leg (heel to crotch) (in cm)								
OL Outer Leg (heel to hip) (in cm)								
LL Lower Leg (heel to knee) (in cm)								
STH Sternum (base) to heel (in cm)								
IA Inner Arm (thumb web to shoulder) (in cm)								
FL Foot Length (heel to center of ball of foot) (in cm)								
<b>OUTPUT</b> A Rigging Chart will be returned within 24hrs. For layout see Sample Rigging Chart.								

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## Body Measurement Details

**Fig. 4**

Take all measurements in the outfit in which the rowers row.

**RC** Rowers Experience Category. Rower category will determine the Vertical Pitch and Lateral Pitch. The table below specifies:-

	No.	Vertical Pitch		Lateral Pitch	
		Sweep	Scull	Sweep	Scull
<b>NOVICE</b>					
Girl	1	8 deg	8 deg	nil	nil
Boy	2	8 deg	8 deg	nil	nil
<b>EXPERIENCED</b>					
Woman	3	7 deg	6 deg	1.5 deg	1.5 deg
Man	4	7 deg	6 deg	1.5 deg	1.5 deg
<b>SPECIAL</b>	5	you nominate in the Coach Constraints Section for VP and LP			

**RW** Rowers Weight in regatta day uniform AS WORN for RACING (in kg). Sox, gloves, shoes etc. affect calculations.

**RH** Rowers Height standing straight at full height (in cm)

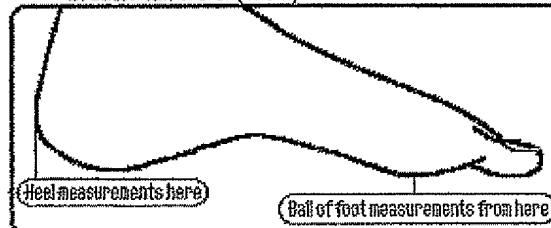
**IL** Inner Leg taken from the Heel to the Crotch both heels together and feet flat on the ground. (in cm)

**OL** Outer Leg taken from Heel to top of Greater trochanter both heels together and feet flat. Measure the rower in regatta uniform AS WORN for RACING (in cm).

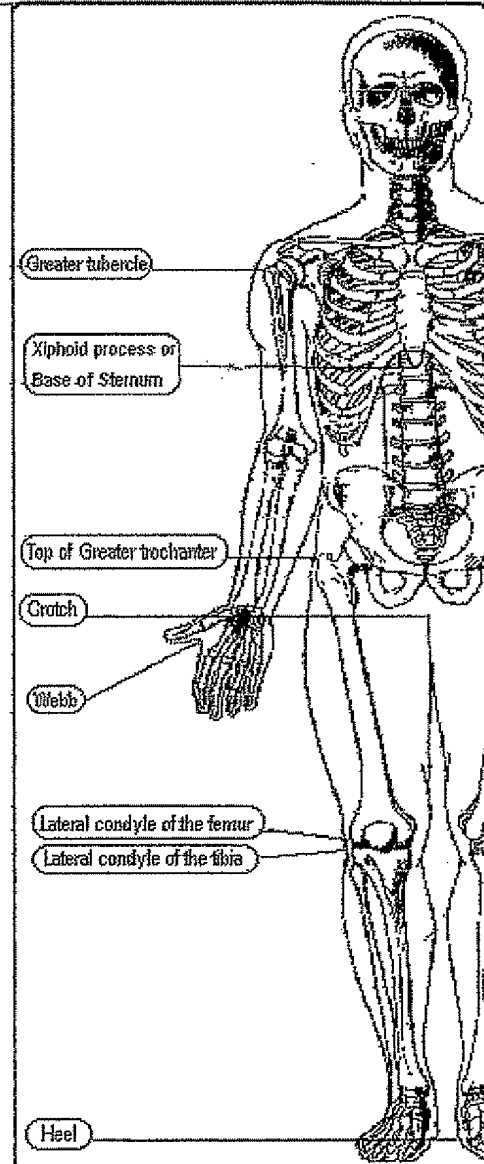
**LL** Lower Leg taken from the Heel to the Lateral condyle of the tibia not the Lateral condyle of the femur. Both heels together and feet flat (in cm)

**STH** Sternum to Heel Taken from Heel to the base of the the Sternum heels together and feet flat. (in cm)

**IA** Inner Arm. Taken from the thumb Webb to the Greater tubercle. (in cm)



**FL** Foot Length. Taken from heel to centre of the ball the foot on the inside of the foot. (in cm)



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**Coach Variables****Fig. 5**

The more accurate your measurements the more efficient the output.

BOAT DETAIL		INPUT		RECOMMENDATIONS					
RO Regatta On date				1. Print Coach Variables and <u>Coach Variables Details</u> forms from the Web					
RA Regatta At place									
BN Boat Name									
Retain a copy of this in your register so you will not have to measure the boat again unless you make changes to the equipment.		Once you have done all the measurements Email them on the <u>Input and Payment Form</u> .							
<p>WHEN FILLING OUT THE FOLLOWING TABLE START AT THE LEFT COLUMN AND INDICATE THE STROKE THEN MOVE TOWARDS THE RIGHT COLUMN INDICATING THE VARIOUS POSITIONS IN THE BOAT IN ORDER TO THE BOW (3)</p>									
ROWER DETAIL		USE for All Boats				USE for 8+ only			
		8/4/2/1	7/3/1	6/2	5/1	4	3	2	1
PIB	Position in Boat								
SAP	Slide Ahead of Pin ( in cm )								
OI	Oar Inboard ( in cm )								
SOO	Scull Oar Overlap ( in cm )								
GHD	Gate Height Difference ( in cm )								
SOP	Scull Oar Position ( L/R = 1, R/L = 2 )								
GR	Gearing Ratio ( — : 1 )								
CA	Catch Angle to keel ( in deg )								
FA	Finishing Angle to keel ( in deg )								
SS	Spread/Span ( Fixed = 1, Variable = 2 )								
LBA	Lay-back Angle ( in deg )								
VP	Vertical Pitch ( in deg )								
LP	Lateral Pitch ( in deg )								

**OUTPUT** A Rigging Chart will be returned within 24hrs. For layout see Sample Rigging Chart.

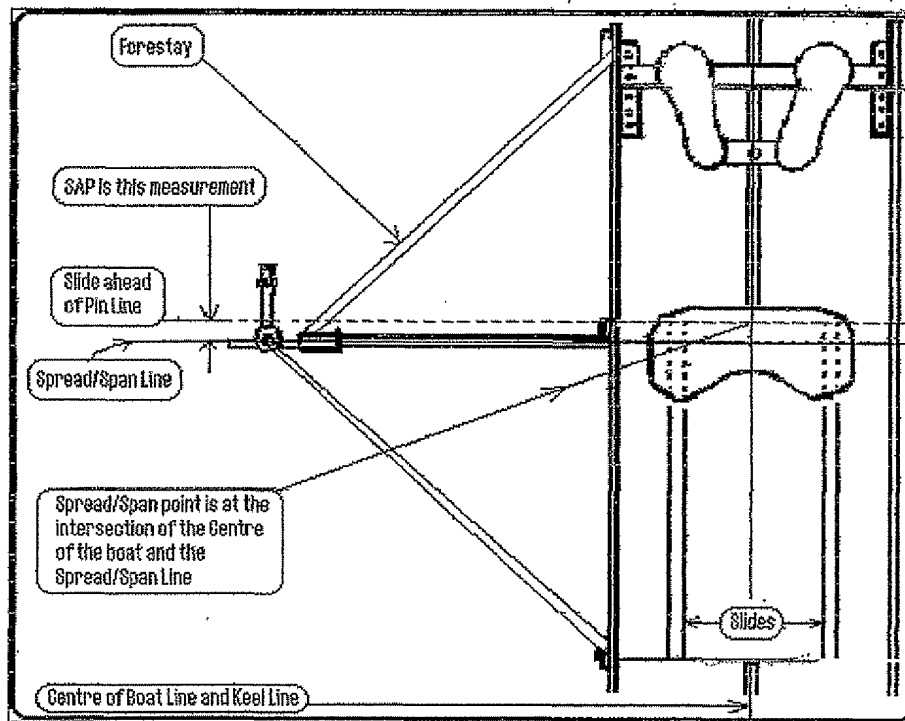
Are there any further variables that you wish to be considered in calculations	
--	--

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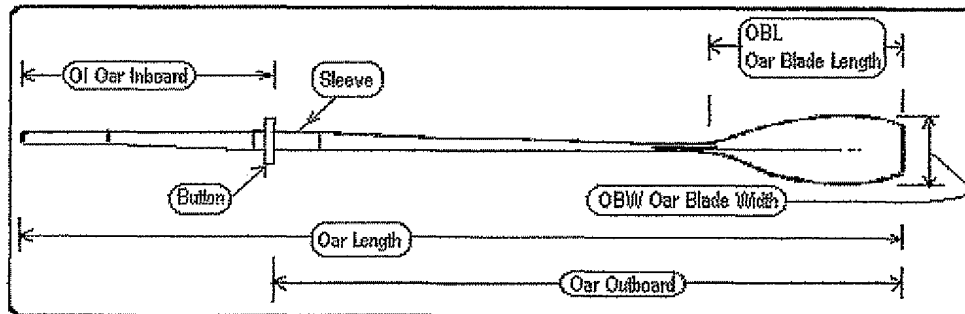
## Coach Variables Details

Fig. 6p1

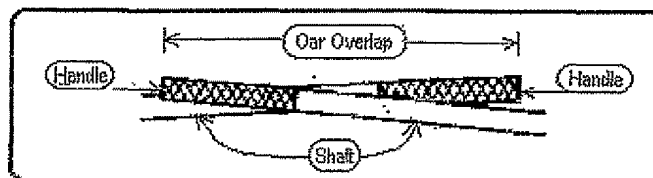


**SAP** Slide Ahead of Pin The distance in which work is done in front of the Pin ( in cm )

**OI** Oar Inboard The distance between the heel of the oar and blade side of the button. ( cm )



**SOO** Scull Oar Overlap The distance the heels of the handles overlap. ( cm )



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**Coach Variables Details****Fig. 6p2**

**GHD** Gate Height Difference for sculls ( cm )

**SOP** Scull Oar Position Left over Right = 1 and Right over Left = 2. If the sculler has the left hand above the right hand at the finish then this is a ( 1 ) ( cm )

**GR** Gearing Ratio The ratio you wish your rowers/scullers to have their Oar Outboard divided by their Spread/Span to equal a ratio.

**CA** Catch Angle The angle to the keel through the pin you want your rowers/scullers oar blades to enter the water ( deg ). Between 40 to 45 degrees. Usually 45 deg.

**FA** Finishing Angle The angle to the keel through the pin you want your rowers/scullers to extract their oar blades from the water (deg ). Between 45 to 50 degrees depending on the Working Arch required.

**SS** Spread/ Span The Fixed ( 1 ) where all rowers have the same **SS** or can be Variable ( 2 ) where the **SS** varies depending on the rowers height. The oar length will also vary should the **GR** be common.

**LBA** Lay-back Angle The angle to the vertical in which you expect your rower/sculler to finish ( deg ).

**VP** Vertical Pitch The pitch you want the oar blade to be with the oar shaft at a right angle to the keel ( deg ).

**LP** Lateral Pitch By changing the lateral pitch from the vertical you can change to blade entry pitch at the catch and the blade exit pitch at the finish ( deg ).

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## Boat Centre of Gravity

Fig.7

The more accurate your measurements the more efficient the output.

BOAT DETAIL	INPUT	RECOMMENDATIONS
RO Regatta On date		1. Print off Boat C of G and Boat C of G Details forms from the Web
RA Regatta At place		
BN Boat Name		
BC Boat Category		2. Retain copies for your records so you will not have to re-measure the whole crew if you have a crew change.
1=1X 2=2X 3=3X 4=4X 5=2X 6=2X 7=4X 8=2X 9=6X		
BL Boat Length (cm)		*** Oars Same weight under BOAT Different weight under ROWER
BW Boat Weight (kg)		
OW Oar Weight if all oars same weight (kg)		
<b>COXSWAIN DETAILS</b>		3. Once you have done all the measurements e-mail them on the <u>Input and Payment Form</u>
CN Cox's Name (5 letters)		
CW Cox's Weight (kg)		
DSC Distance from stern to center of seat (cm)		
DOB Date of Birth (if app)		

WHEN FILLING OUT THE FOLLOWING TABLE START AT THE LEFT COLUMN AND INDICATE THE STROKE THEN MOVE TOWARDS THE RIGHT COLUMN INDICATING THE VARIOUS POSITIONS IN THE BOAT IN ORDER TO THE BOW (1).

ROWER DETAIL	USE for All Boats				USE for 8+ only			
	8/4/2/1	7/3/1	6/2	5/1	4	3	2	1
PIB Position in Boat								
STS Distance from spread/ span point to stern (in cm)								
OW Oar weight if PIB's have different weighted oars								
RN Rower's Name (first 4 letters)								
RW Rower's Weight (in kg)								
RH Rower's Height (in cm)								
IL Length of Inner Leg (in cm)								
IA Length of Inner Arm (in cm)								
<b>COACH VARIABLES</b>								
SAP Slide distance ahead of spread/ span point (cm)								
OI Oar Inboard (in cm)								
GR Gearing Ratio (—: 1)								
CA Catch Angle to keel (in deg)								
FA Finishing Angle to keel (in deg)								
SS Span (set = 1, Var = 2)								
LBA Lay-back Angle (in deg)								
DISCLAIMER should your boat have had major repairs which could affect normal boat balance this program WILL NOT BE OF ANY BENEFIT. Do not request a Centre of Gravity.								
OUTPUT A C of G Chart will be returned within 24hrs. For layout see Sample C of G Chart								

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## Boat Centre of Gravity Detail

Fig. 8

Do all measurements fitted out as if rowing in a regatta.

### BOAT DETAILS

**RO** Regatta on ( date )

**RA** Regatta at ( place )

**BN** Boat Name

**BC** Boat Category

1=1X 2=2X 3=4X 4=4X+ 5=2+ 6=2+ 7=4+ 8=4+ 9=8+

**BL** Boat Length from Stern to Bow ensure tape is straight and tight. ( in cm )

**BW** Boat Weight fully rigged without crew and oars. ( in kg )

\*\*\* **OW** Oar Weight If all oars are of the same weight indicate under Boat Details otherwise indicate under Rower Details ( in Kg )

### COXSWAIN DETAIL

**CN** Cox's Name

**CW** Cox's Weight 9 ( in kg )

**DSC** Distance from stern to centre of Coxswain seat. ( in cm )

**DOB** Date of Birth ( if App )

### ROWER DETAIL

( for more detail and diagrams on the following ( Refer to Body Measurement Details for method ) )

**PIB** Position in Boat

**STS** Distance from stern to spread / span (s/s) point for each PIB ( in cm )

**RN** Rower Name ( use 4 letters )

**RH** Rower Height

**IL** Inner Leg taken from the Heel to the Crotch both heels together and feet flat on the ground. ( in cm )

**IA** Inner Arm. Taken from the thumb Webb to the Greater tubercle. ( in cm )

### COACH VARIABLES

( for more detail and diagrams on the following ( Refer to Coach Variables Detail for method ) )

**SAP** Slide ahead of Pin. Is that distance that work is done in front of the Pin ( in cm )

**OI** Oar Inboard The distance between the heel of the oar and blade side of the button. ( in cm )

**GR** Gearing Ratio The ratio you wish your rowers/scullers to have their Oar Outboard divided by their Spread/Span to equal a ratio.

**CA** Catch Angle The angle to the keel through the pin you want your rowers/scullers oar/s blade to enter the water ( in deg ). Between 40 to 45 degrees. Usually 45 deg.

**FA** Finishing Angle The angle to the keel through the pin you want your rowers/scullers to extract their oar/s from the water ( in deg ). Between 45 to 50 degrees depending on the Working Arch required.

**LBA** Lay-back Angle The angle to the vertical in which you expect your rower/sculler back to finish before extraction ( in deg ).

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## Input and Payment Form

Fig.9<sub>p1</sub>

The more accurate your measurement the more efficient the output.

REGATTA DETAILS		Type of calculations to be performed indicate	
RO	Regatta On (Date)	1 = ON	2 = BN
RA	Regatta At (place)	3 = WE	4 = ME
RC	Rowers Category	5 = Special and you nominate pitch under VP & LP under Coach Variables	
BOAT DETAILS			
BN	Boat Name		
BC	Boat Category	9 = 1 = 1X 2 = 2X 3 = 4X 4 = 4X 5 = 2 6 = 2 7 = 4 8 = 4 9 = 8	
BL	Boat Length		
BW	Boat Weight		
BOAT MEASUREMENTS			
PIS	Position in Boat		
STS	Stem to S/pl		
WB	Width of Boat at S/pl		
BD	Boat Depth at S/pl		
WLW	Wine to W/board (ton)		
STW	Seat to W/board (ton)		
PD	Pin Diameter		
GBO	Gate Base Offset		
ODB	Oar Diameter at Burton		
ODH	Oar Diameter at Handle		
OOH	Oar Offset at Handle		
PAK	First angle to Reel		
FSA	First sep. angle H to H		
FSW	First Support to top of W/board		
FHK	First rest distance Heel to Reel		
OT	Oar Type 1 = o 2 = m		
OBL	Oar Blade Length		
OBW	Oar Blade Width		
OBA	Oar Blade angle to shaft		
OW	Oar Weight		
SAS	Seat Axle Spacing		

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## Input and Payment Form

Fig.9 p2

The more accurate your measurement the more efficient the output.

COXSWAIN	
CN	Cox's Name
CW	Cox's Weight
DSC	Stern to Box
DOB	Date of Birth (if app)
ROWER'S BODY DETAIL	
PIB	Position in Boat      Stroke      3      2      Bow
RN	Rowers Name (first 6)
DOB	Date of Birth (if app)
RC	Rowers Category
RW	Rowers Weight
RH	Rowers Height
IL	Inner Leg
OL	Outer Leg
LL	Lower Leg
STH	Stern to Heel
IA	Inner Arm
FL	Foot Length
COACH VARIABLES	
PIB	Position in Boat      Stroke      3      2      Bow
SAP	Slide ahead of Pin
OI	Oar Inboard
SOD	Scull Oar Overlap
GHD	Gate Height Difference
SOP	Scull Oar Position
LR = 1, RL = 2	
GR	Gearing Ratio
CA	Catch Angle to Keel
FA	Finishing Angle to Keel
SS	Span Set = 1, Var = 2
LBA	Layback Angle
VP	Vehicle Pitch
LP	Lateral Pitch
PS	Preferred Stroke

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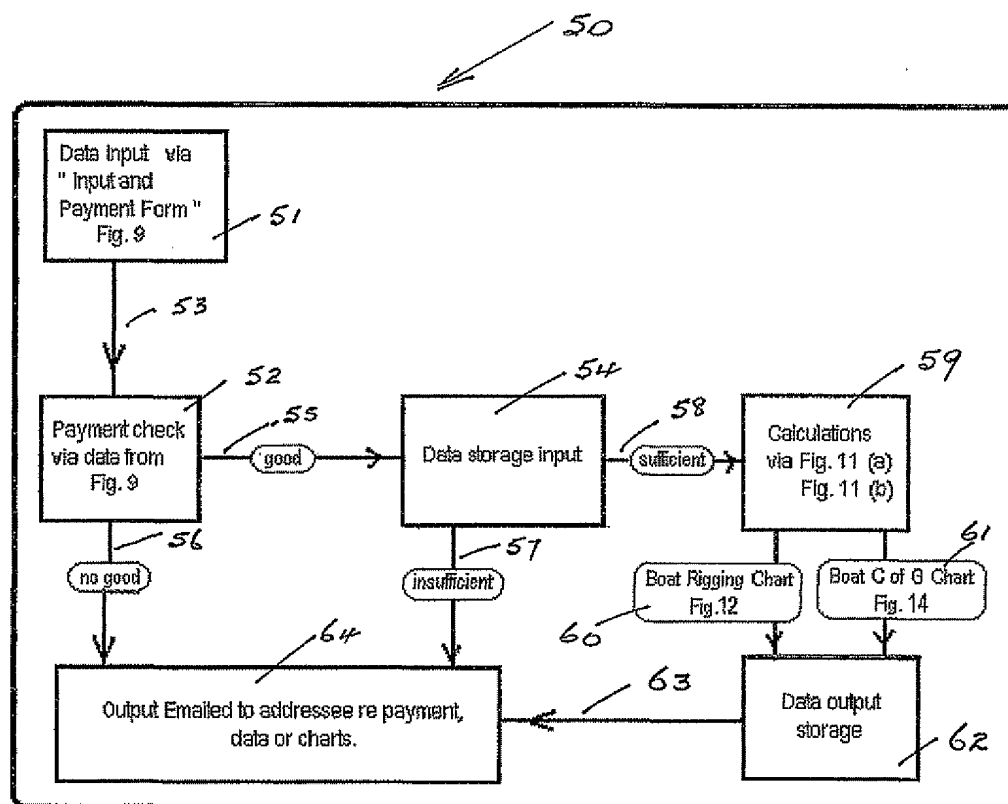
**Input and Payment Form****Fig. 9**<sub>pt3</sub>

<b>Payment Form</b>	
<b>Enter Your Credit Card Details</b>	
<b>* Required Fields</b>	
<b>* Card Type</b>	<b>* Card Number</b>
<input type="checkbox"/> VISA	<input type="text"/>
<input type="checkbox"/> Master Card	<b>* Expires</b>
<input type="checkbox"/> Bankcard	<input type="text" value="MM"/> <input type="text" value="YY"/> <input type="text" value="YEAR"/> <input type="text" value="MM"/> <input type="text" value="YY"/>
	<b>* Name ( First )</b>
	<input type="text"/>
	<b>* Name ( Last )</b>
	<input type="text"/>
<b>Enter Your Billing Address</b>	
Please be advised if the address entered here does not agree with your card billing address for your credit card your request will be ignored.	
<b>* Required Fields</b>	
<b>*Address line 1</b>	<input type="text"/>
<b>*Address line 2</b>	<input type="text"/>
<b>*Address line 3</b>	<input type="text"/>
<b>*City</b>	<input type="text"/>
<b>*State</b>	<input type="text"/>
<b>*Country</b>	<input type="text"/>
<b>*Zip Code</b>	<input type="text"/>
International Telephone Number	<input type="text"/>
Country Telephone Number	<input type="text"/>
<b>Enter Your Return E-mail Address</b>	
My e-mail address for Da Vic Rowing's Charts is <input type="text"/>	

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## Block Diagram

Fig. 10



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## Input Summary

Fig. 11<sub>p1</sub>

### Variables used in calculating the Rigging Chart Output

#### 1. Slide Length :-

- RH Rower Height
- SAP Slide ahead of Pin

#### 2. Spread Span point to Finish pt

- RH Rower Height

#### 3. Spread Span pt to Footheel pt

- RH Rower Height
- IL Inner Leg

#### 4. Footrest Heel to Washboard

- RH Rower Height
- IL Inner Leg
- LL Lower Leg
- OL Outer Leg
- STW Lowest point of seat to top of washboard

#### 5. Spread Span point to Pin (span)

- RH Rower Height
- FA Finishing Angle
- GBO Gate Base Offset
- PD Pin Diameter
- OOH Oar Offset at Handle
- ODB Oar Diameter at Button
- ODH Oar Diameter at Handle
- OT Oar Type
- LBA Layback Angle
- SS Spread Span Type

#### 6. Gate Height

- RH Rower Height
- SAS Seat Axle Spacing
- STH Sternum (base) to heel
- IL Inner Leg
- STW Lowest point of seat to top of washboard
- WLW Waterline to washboard with boat fully crewed and equipped
- GR Gearing Ratio
- FA Finishing Angle
- GBO Gate Base Offset
- PD Pin Diameter
- OOH Oar Offset at Handle
- ODB Oar Diameter at Button
- ODH Oar Diameter at Handle
- OT Oar Type
- OBL Oar Blade Length

**Input Summary ( continued )****Fig. 11<sub>p2</sub>****6. Gate Height continued**

- OBW Oar Blade Width
- OBA Oar Blade Angle
- GHD Gate Height Difference
- SOP Scull Oar Position
- STS Distance from Stern To Spread/Spat point
- DB Depth of Boat at spread/span line of washboard to bottom of keel

**7. Oar Length**

- GR Gearing Ratio
- RH Rower Height
- FA Finishing Angle
- GBO Gate Base Offset
- PD Pin Diameter
- OOH Oar Offset at Handle
- BC Boat Category
- ODB Oar Diameter at Button
- ODH Oar Diameter at Handle
- OT Oar Type
- LBA Lay-back Angle
- SOO Scull Oar Overlap
- OI Oar Inboard

**8. Catch Pitch**

- CA Catch Angle
- RC Rower Category
- BC Boat Category
- VP Vertical Pitch
- LP Lateral Pitch

**9. Finish Pitch**

- FA Finishing Angle
- RC Rower Category
- BC Boat Category
- VP Vertical Pitch
- LP Lateral Pitch

**10. Working Arch**

- CA Catch Angle
- FA Finishing Angle

**11. Span Line to Finish Arch Point**

- RH Rower Height
- FA Finishing Angle
- GBO Gate Base Offset
- PD Pin Diameter
- OOH Oar Offset at Handle
- ODB Oar Diameter at Button
- ODH Oar Diameter at Handle



**Input Summary ( continued )****Fig. 11<sub>p3</sub>****11. Span Line to Finish Arch Point ( continued )**

- OT Oar Type
- LBA Lay-back Angle
- WB Width of Boat

**12. Finish Arch Pt to Catch Arch Pt**

- BC Boat Category
- RH Rower Height
- FA Finishing Angle
- GBO Gate Base Offset
- PD Pin Diameter
- OOH Oar Offset at Handle
- ODB Oar Diameter at Button
- ODH Oar Diameter at Handle
- OT Oar Type
- LBA Lay-back Angle
- WB Width of boat
- CA Catch Angle
- IA Inner Arm

**13. Available Boat Oar Shift/Stroke**

- FA Finishing Angle
- CA Catch Angle
- OBL Oar Blade Length
- GR Gearing Ratio
- RH Rower Height
- GBO Gate Base Offset
- PD Pin Diameter
- OOH Oar Offset at Handle
- ODH Oar Diameter at Handle
- ODB Oar Diameter at Button
- BC Boat Category
- OT Oar Type
- LBA Lay-back Angle
- SOO Scull Oar Overlap

**14. Ideal Footrest Top Support Position**

- RH Rower Height
- IL Inner Leg
- LL Lower Leg
- OT Outer Leg
- STW Lowest point of seat to top of washboard
- FAK Footrest Angle to Keel
- FSA Footrest Separation Angle
- FSW Footrest Support to Washboard (present)
- FHK Footrest Heel to bottom of Keel

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**Input Summary****Fig. 11 (b)****Variables used in calculating the Boat Centre of Gravity Output****Boat Centre of Gravity**

- BC Boat Category
- BL Boat Length
- BW Boat Width
- OW Oar Weight
- CW Cox's Weight
- DSC Distance from Stern to center of Cox's seat
- PIB Position In Boat
- STS Distance from Spread/Span point To Stern
- RW Rowers Weight
- RH Rowers Height
- IL Inner Leg
- IA Inner Arm
- SAP Slide Ahead of spread/span Point
- OI Oar Inboard
- GR Gearing Ratio
- CA Catch Angle
- FA Finishing Angle
- SS Span Type
- LBA Lay-back Angle

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## Sample Rigging Chart

Fig.12

RowRig (Computer Rigging) by											
Rigging Chart for EIGHT Simpson											
on 12-Jun-00 at Sydney Olympic Trials											
Boat for EIGHT Simpson											
PIB	STROKE			RN	Black	PIB	SEVEN			RN	White
DOB	12-Jan-71			RC	5	DOB	13-Feb-72			RC	5
					cm					cm	
RW	kg	67.80	RH		175.00	RW	kg	58.00	RH	175.00	
IL	cm	81.00	OL		86.00	IL	cm	81.00	OL	86.00	
LL	cm	49.00	STH		119.00	LL	cm	48.40	STH	120.00	
IA	cm	54.00	FL		20.00	IA	cm	57.00	FL	19.50	
Slide Length					61.00	Slide Length					66.00
SAP	cm	0	OI		115.00	SAP	cm	5	OI	115.00	
Spread Span point to Finish pt					61.00	Spread Span point to Finish pt					61.00
Spread Span pt to Footheel pt					20.00	Spread Span pt to Footheel pt					20.00
Footrest Heel to Washboard					28.40	Footrest Heel to Washboard					27.10
Spread Span point to Pin (span)					85.00	Spread Span point to Pin (span)					85.00
Gate Height (gate inside to w/board) depends on posture. For good posture start at					5.30	Gate Height (gate inside to w/board) depends on posture. For good posture start at					6.00
GR to 1 ratio					2.56	GR to 1 ratio					2.56
Oar Length					332.50	Oar Length					332.50
VP	deg	6.00	LP	deg	0.00	VP	deg	6.00	LP	deg	1.50
Catch Pitch 6.00 Finish Pitch					6.00	Catch Pitch 6.75 Finish Pitch					5.39
CA	deg	45.00	FA	deg	53.50	CA	deg	45.00	FA	deg	53.50
Working Arch					81.50	Working Arch					81.50
Span Line to Finish Arch Point					44.00	Span Line to Finish Arch Point					41.80
Finish Arch Pt to Catch Arch Pt					112.70	Finish Arch Pt to Catch Arch Pt					107.50
Available Boat Oar Shift/Stroke					245.50	Available Boat Oar Shift/Stroke					245.5
PIB	SIX			RN	Green	PIB	FIVE			RN	Red
DOB	14-Mar-73			RC	5	DOB	15-Apr-74			RC	5
					cm					cm	
RW	kg	60.00	RH		180.00	RW	kg	74.00	RH	180.00	
IL	cm	82.00	OL		87.00	IL	cm	84.00	OL	89.00	
LL	cm	49.00	STH		120.00	LL	cm	50.00	STH	119.00	
IA	cm	55.00	FL		20.00	IA	cm	56.00	FL	18.00	
Slide Length					62.00	Slide Length					62.00
SAP	cm	0	OI		115.00	SAP	cm	0	OI	115.00	
Spread Span point to Finish pt					62.00	Spread Span point to Finish pt					62.00
Spread Span pt to Footheel pt					20.00	Spread Span pt to Footheel pt					22.00
Footrest Heel to Washboard					27.70	Footrest Heel to Washboard					28.80
Spread Span point to Pin (span)					86.30	Spread Span point to Pin (span)					86.30
Gate Height (gate inside to w/board) depends on posture. For good posture start at					5.70	Gate Height (gate inside to w/board) depends on posture. For good posture start at					3.50
GR to 1 ratio					2.66	GR to 1 ratio					2.66
Oar Length					344.60	Oar Length					344.6
VP	deg	6.00	LP	deg	1.00	VP	deg	6.00	LP	deg	1.00
Catch Pitch 6.50 Finish Pitch					5.59	Catch Pitch 6.50 Finish Pitch					5.59
CA	deg	45.00	FA	deg	53.50	CA	deg	45.00	FA	deg	53.50
Working Arch					81.50	Working Arch					81.50
Span Line to Finish Arch Point					41.30	Span Line to Finish Arch Point					40.20
Finish Arch Pt to Catch Arch Pt					106.30	Finish Arch Pt to Catch Arch Pt					103.70
Available Boat Oar Shift/Stroke					261.20	Available Boat Oar Shift/Stroke					261.20

### mark on slide support on pin side of boat to align centre of rear seat axle.  
### and ### mark on washboard on pin side of boat.

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## Rigging Chart Instructions

Fig. 13p1

**Note for :-****Sculls**

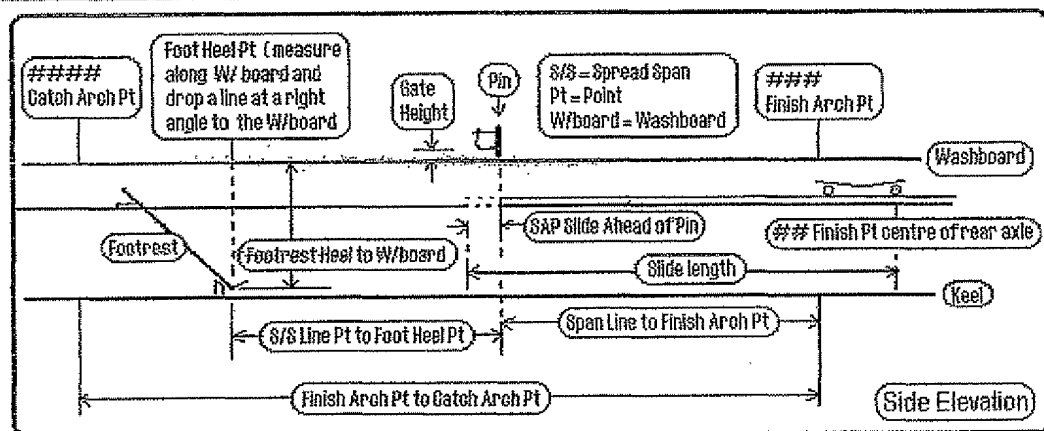
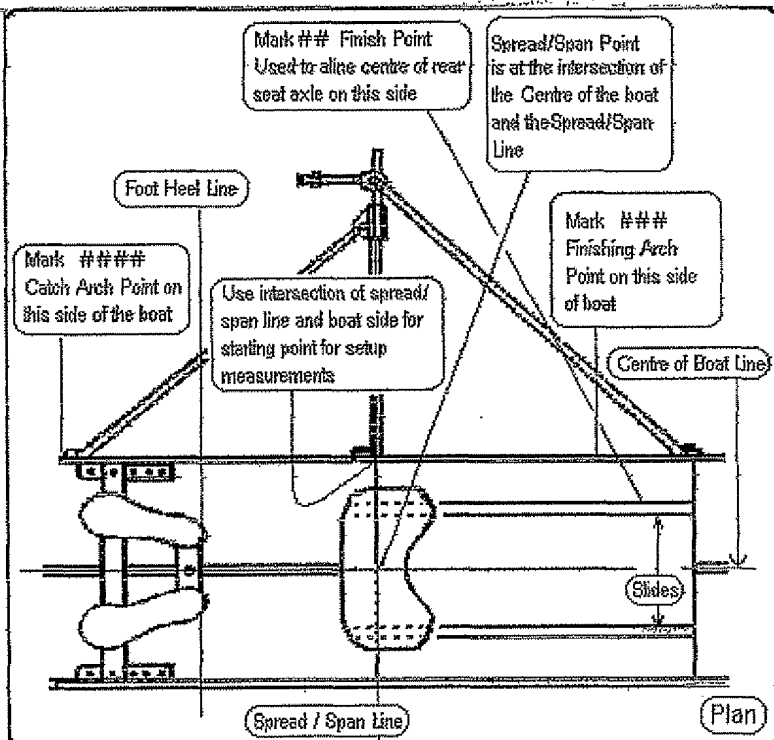
**BC (Boat Categories) 1 – 4**  
mark on both sides of the boat's washboard

**Sweep****BC 5 – 9**

mark only on the Pin Side of the boat's washboard

**Finish Point**

This point is marked in proximity to the seat slide so the centre of the rear axle of the seat can be aligned



**Slide Length** Length of the slide includes the SAP ( if applicable ).

**Spread Span Pt to Finish Pt** Distance from the Spread Span Point to the Finishing Point ( towards Bow )

**Spread Span Pt to Foot Heel Pt** Measured from the Spread Span Line ( towards the stern ) along the center of the boat. A line is dropped at right angles towards the keel ( refer to second diagram )

**Footrest Heel to Washboard** Distance from Footrest Heel to the top of the Washboard ( refer second diagram ).

**Spread Span Pt to Pin (Span)** Distance from Spread Span Pt to Pin center ( at a right angle to the Center of Boat Line )

**Gate Height** Distance from the top of the washboard to the inside bottom of the gate in cm.

**Oar Length** Oar Length required to satisfy the variables the coach has set.

## Rigging Chart Instructions

**Fig. 13**<sub>p2</sub>

**Catch Pitch** The pitch of the oar blade at the catch (entry)

**Finish Pitch** The pitch of the oar blade at the finish (extraction)

**Working Arch** The arch of work to be done

**Span Line to Finish Arch Pt** Distance from a point where the spread span line crosses the pin side of the boat to oar extraction point on the pin side of the boat.

**Finish Arch Pt to Catch Arch Pt** Distance from oar extraction point to the oar entry point, along the pin side of the boat.

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## Sample Centre of Gravity Chart

Fig.14

Row/Rig (Computer Rigging) by								
Centre of Gravity Chart for EIGHT Simpson								
on 12 Jun 00 at Sydney Olympic Trials								
Boats for people not people for boats								
RN	PIB	STS	RW	OW	OarW	12.00	CrewW	562.10
Multi	COXSWAIN	265.00	46.00		Boat W	122.00	TotalW	696.10
Black	STROKE	410.00	67.80	1.50	BL	1737.00	Release	Catch
White	SEVEN	542.00	58.00	1.50		C of Boat	868.50	868.50
Green	SIX	674.00	60.00	1.50		C of G	876.50	876.50
Red	FIVE	807.00	74.00	1.50		PIB 5	869.00	785.00
Yellow	FOUR	940.00	69.00	1.50		R/P 5 C/B	0.50	-83.50
Brown	THREE	1072.00	61.80	1.50		R/P 5 C/G	-7.50	-28.70
Blue	TWO	1204.00	68.50	1.50		R/P CB/CG	8.00	-54.80
Orange	BOW	1337.00	57.00	1.50		Half Dif CG	31.40	31.40
Equal motion about Centre of boat gives the best C of G at Release and Catch								
To achieve the AIM :-								
EITHER add weight in kg at the following PIB.								
RN	PIB	Add kg at	RW	OW	OarW	12.00	CrewW	594.70
Multi	COXSWAIN	0.00	46.00		Boat W	122.00	TotalW	728.70
Black	STROKE	0.00	67.80	1.50	BL	1737.00	Release	Catch
White	SEVEN	0.00	58.00	1.50		C of Boat	868.50	868.50
Green	SIX	0.00	60.00	1.50		C of G	899.90	836.90
Red	FIVE	0.00	74.00	1.50		PIB 5	869.00	785.00
Yellow	FOUR	0.00	69.00	1.50		R/P 5 C/B	0.50	-83.50
Brown	THREE	0.00	61.80	1.50		R/P 5 C/G	-30.90	-51.00
Blue	TWO	0.00	68.50	1.50		R/P CB/CG	31.40	-32.50
Orange	BOW	32.60	89.60	1.50		Half Dif CG	31.90	31.90
In adding 32.60 increases gross weight to 728.70 from 696.10								
This increase in weight has increased the wetted surface area by 1450%								
OR a change in the rowers PIB may bring the C of G to the AIM at 899.90 837.10								
	PIB	New PIB	RW	OW	OarW	12.00	CrewW	562.10
	COXSWAIN	Multi	46.00		Boat W	122.00	TotalW	696.10
	STROKE	Brown	61.80	1.50	BL	1737.00	Release	Catch
	SEVEN	Orange	57.00	1.50		C of Boat	868.50	868.50
	SIX	White	58.00	1.50		C of G	896.30	833.40
	FIVE	Green	60.00	1.50		PIB 5	869.00	785.00
	FOUR	Black	67.80	1.50		R/P 5 C/B	0.50	-83.50
	THREE	Blue	68.50	1.50		R/P 5 C/G	-27.30	-48.40
	TWO	Yellow	69.00	1.50		R/P CB/CG	27.80	-35.10
	BOW	Red	74.00	1.50		Half Dif CG	31.40	31.40
Changed PIB has improved C of G from original 876.50 to 896.30								
by adding weight at the NEW PIB for the CREW.								
AND	PIB	Add to	RW	OW	OarW	12.00	CrewW	567.10
Multi	COXSWAIN	0.00	46.00		Boat W	122.00	TotalW	701.10
Brown	STROKE	0.00	61.80	1.50	BL	1737.00	Release	Catch
Orange	SEVEN	0.00	57.00	1.50		C of Boat	868.5	868.50
White	SIX	0.00	58.00	1.50		C of G	899.9	836.90
Green	FIVE	0.00	60.00	1.50		PIB 5	869	785.00
Black	FOUR	0.00	67.80	1.50		R/P 5 C/B	0.5	-83.50
Blue	THREE	0.00	68.50	1.50		R/P 5 C/G	-30.9	-51.90
Yellow	TWO	0.00	69.00	1.50		R/P CB/CG	31.4	-31.60
Red	BOW	5.00	79.00	1.50		Half Dif CG	31.5	31.50
Added 5.00 gives increase in weight to 701.10 as to 696.10								
The changed PIB and the addition of weight has increased wetted surface area by 0.70%								
You may need to resubmit new PIB and detail for recalculation under Boat Rigging								
Any queries to Vic at De Vic Rowing / Computer Rigging / Email: www.davicrowing.com								

## INTERNATIONAL SEARCH REPORT

 International application No.  
**PCT/AU01/01421**

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>																						
Int. Cl. <sup>7</sup> : A63B 69/06																						
According to International Patent Classification (IPC) or to both national classification and IPC																						
<b>B. FIELDS SEARCHED</b>																						
Minimum documentation searched (classification system followed by classification symbols) IPC: AS ABOVE																						
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																						
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT, USPTO (rowing, computer)																						
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>																						
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																				
O,A	Milan Misljenovic's Web Page <a href="http://www.asj.org.yu/mme/html/photo_album.html">http://www.asj.org.yu/mme/html/photo_album.html</a> especially StrokeScanner and PC Rowing Lab	1																				
O,A	Nielson-Kellerman Rowing/Paddling equipment Web Page <a href="http://www.nkhome.com">http://www.nkhome.com</a> especially SpeedCoach and WatchWare	1																				
A	US 6 002 982 (Fry) 14 December 1999 Abstract, figures, column 2 line 46	1																				
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex																						
* Special categories of cited documents: <table border="0"> <tr> <td>"A"</td> <td>document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T"</td> <td>later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E"</td> <td>earlier application or patent but published on or after the international filing date</td> <td>"X"</td> <td>document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L"</td> <td>document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y"</td> <td>document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O"</td> <td>document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;"</td> <td>document member of the same patent family</td> </tr> <tr> <td>"P"</td> <td>document published prior to the international filing date but later than the priority date claimed</td> <td></td> <td></td> </tr> </table>			"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family	"P"	document published prior to the international filing date but later than the priority date claimed		
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"P"	document published prior to the international filing date but later than the priority date claimed																					
Date of the actual completion of the international search <b>12 December 2001</b>		Date of mailing of the international search report <b>18 DEC 2001</b>																				
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: <a href="mailto:pct@ipaustalia.gov.au">pct@ipaustalia.gov.au</a> Facsimile No. (02) 6285 3929		Authorized officer  <b>DALE E. SIVER</b> Telephone No : (02) 6283 2196																				

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU01/01421

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 29704154 (Verein für Forschung und Entwicklung von Sportgeräten) 5 December 1996, Abstract, figures	1
A	DE 29610736 (Verein für Forschung und Entwicklung von Sportgeräten) 24 October 1996, Abstract, figures	1
A	US 5099689 (McGinn) 31 March 1992 Whole document	1,2,3
A	Derwent Abstract SU 919690 (AS USSR Computer) 15 April 1982 PAN 83-c3904k	1
A	Derwent Abstract SU 883 677 (Moscow Electrical Engineering) 23 November 1981 PAN 82-m2819c	1



INTERNATIONAL SEARCH REPORT  
Information on patent family members

International application No.  
PCT/AU01/01421

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
US	6002982	US	6148262
DE	29704154	NO	MEMBERS
DE	29610736	NO	MEMBERS
US	5099689	NO	MEMBERS
END OF ANNEX			